Wuxi Unigroup Microelectronics CO.,LTD.

20V N-Channel Trench MOSFET

Features

- Trench Power Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- High power and current handing capability
- Lead free product is acquired

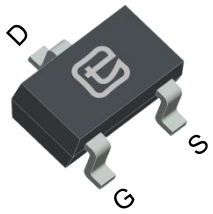
Applications

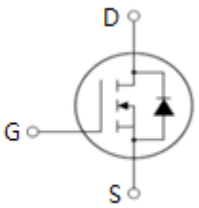
- Battery protection
- Load switch
- Power management

Product Summary

VDS	20V
$R_{DS(ON)}$ (at V_{GS}=10V)	< 18mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 20mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 25mΩ
I_D (at V_{GS}=10V)	5A

RoHS





Device	Package	Marking
TTX2312A	SOT-23	2312A

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage (V_{GS} = 0V)		V_{DSS}	20	V
Continuous Drain Current B	T_C = 25ºC	I_D	5	A
	T_C = 70ºC		4	
Pulsed Drain Current A		I_{DM}	15	A
Gate-Source Voltage		V_{GSS}	±12	V
Single Pulse Avalanche Energy L =0.3mH A		E_{AS}	15	mJ
Avalanche Current A		I_{As}	10	A
Power Dissipation C	T_C = 25ºC	P_D	1.56	W
	T_C = 100ºC		0.62	W
Operating Junction and Storage Temperature Range		T_J, T_{SGT}	-55~+150	ºC

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal Resistance, Junction-to-Lead	R_{thJL}	80	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	125	

Specifications T_J = 25ºC, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 20V, V_{GS} = 0V, T_J = 70ºC	--	--	25	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±12V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.7	0.9	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 4A	--	13.6	18	mΩ
		V_{GS} = 4.5V, I_D = 4A	--	14.9	20	mΩ
		V_{GS} = 2.5V, I_D =4A	--	18	25	mΩ
Forward Transconductance	g_{fs}	V_{DS} = 5V, I_D =6A	--	25	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 10V, f = 1.0MHz	--	870	--	pF
Output Capacitance	C_{oss}		--	119	--	
Reverse Transfer Capacitance	C_{rss}		--	110	--	
Total Gate Charge	Q_g (10V)	V_{DD} = 10V, I_D = 5A, V_{GS} = 10V	--	22.1	--	nC
	Q_g (4.5V)		--	11	--	
Gate-Source Charge	Q_{gs}		--	2	--	
Gate-Drain Charge	Q_{gd}		--	2	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 10V, V_{DD} = 10V, I_D = 3A,R_G = 2.5Ω	--	4	--	ns
Turn-on Rise Time	t_r		--	8.2	--	
Turn-off Delay Time	$t_{d(off)}$		--	22	--	
Turn-off Fall Time	t_f		--	7	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current [B]	I_S	T_C = 25ºC	--	--	5	A
Pulsed Diode Forward Current	I_{SM}		--	--	20	
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 5A, V_{GS} = 0V	--	--	1.2	V

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =150ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

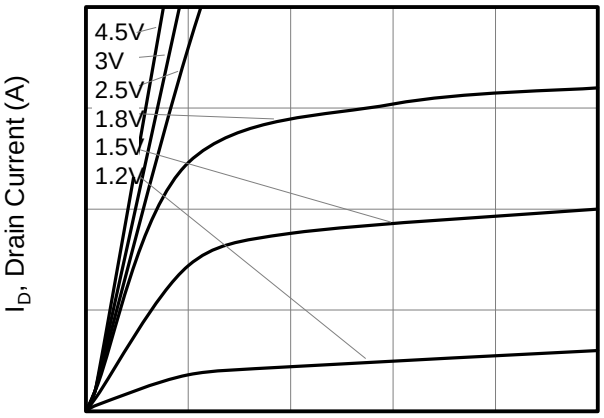


Figure 2. Transfer Characteristics

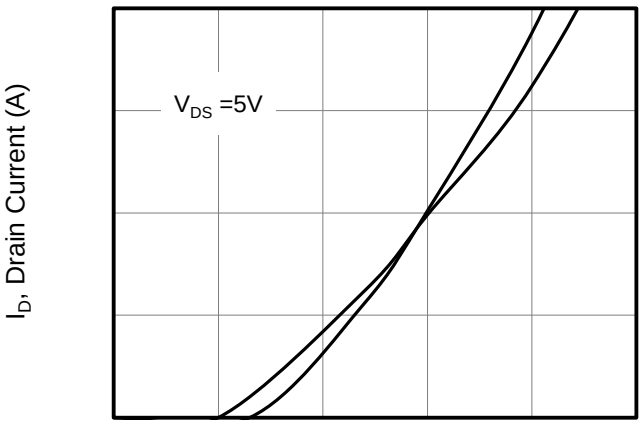


Figure 3. On-Resistance vs. Drain Current

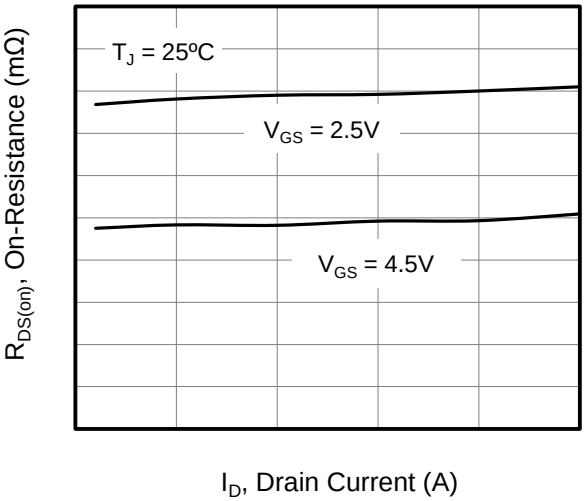


Figure 4. Capacitance

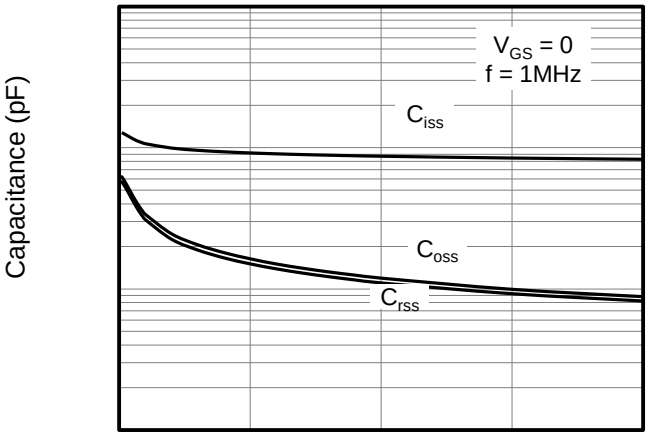


Figure 5. Gate Charge

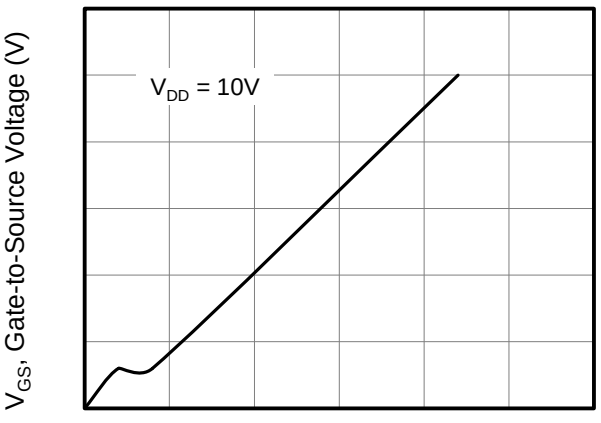
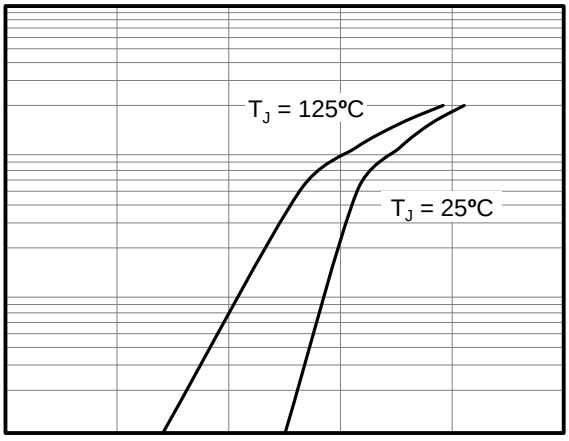


Figure 6. Body Diode Forward Voltage



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

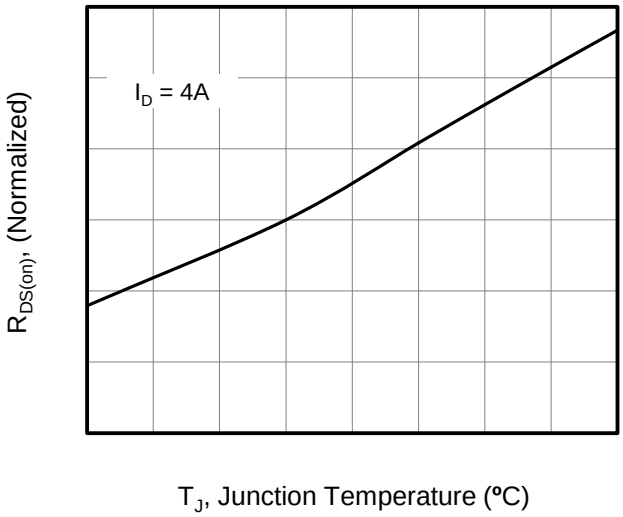


Figure 8. Threshold Voltage vs. Junction Temperature

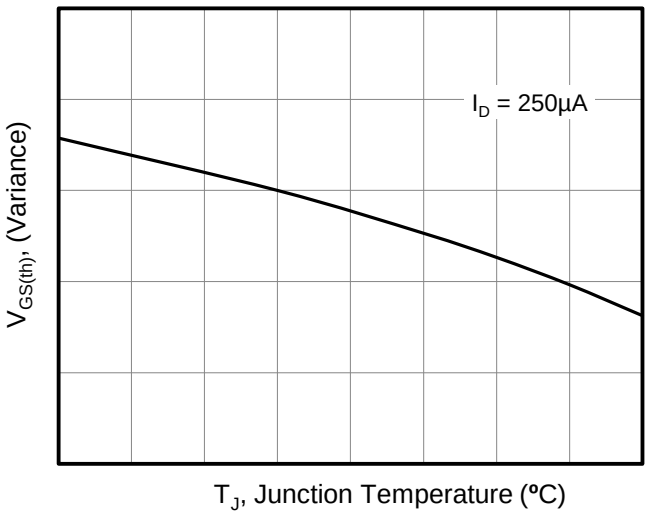


Figure 9. V(BR)DSS vs. Junction Temperature

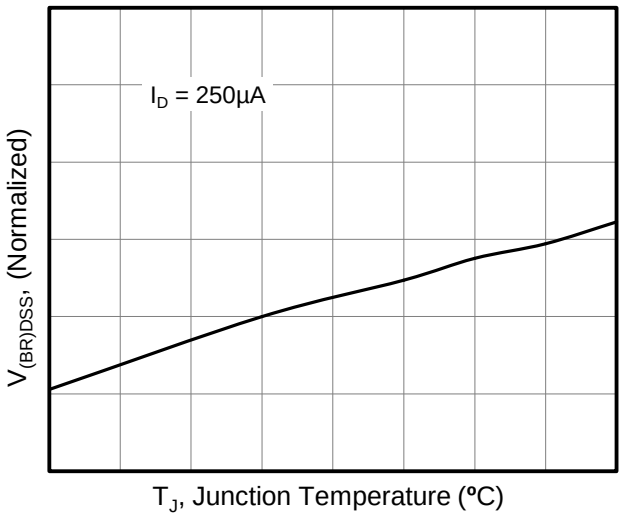


Figure 10. On-Resistance vs. Gate-to-Source Voltage

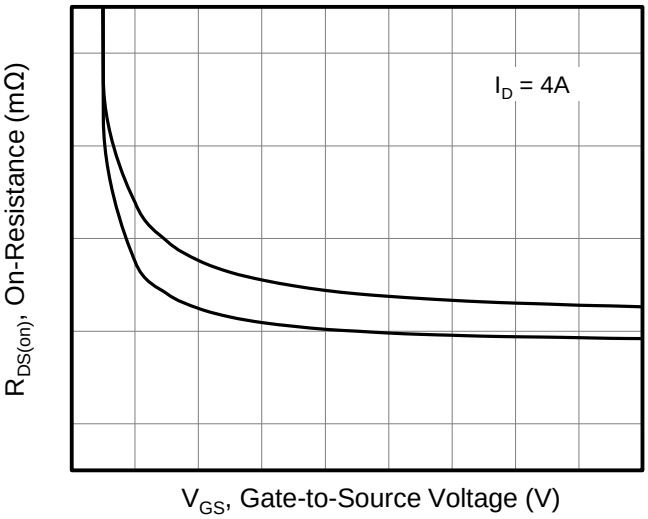


Figure 11. Transient Thermal Impedance

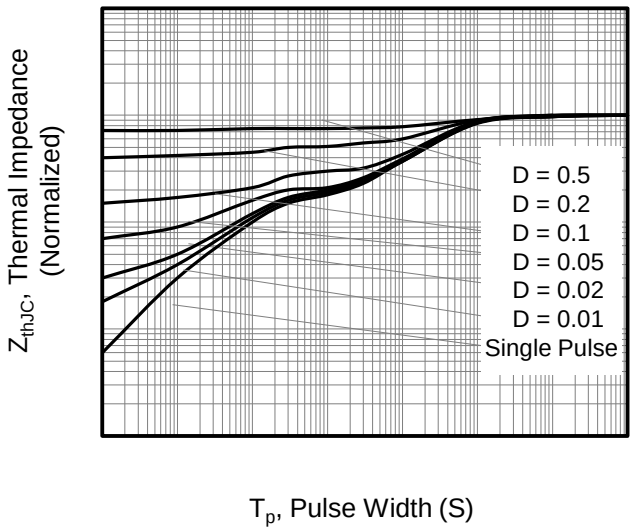


Figure 12. Safe operation area

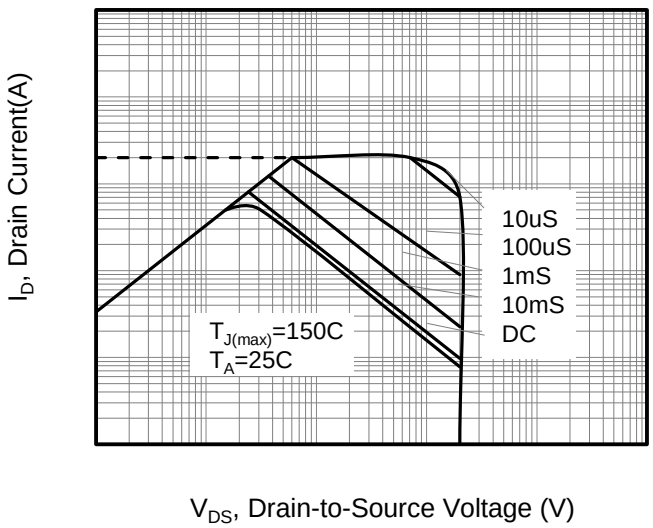


Figure A：Gate Charge Test Circuit and Waveform

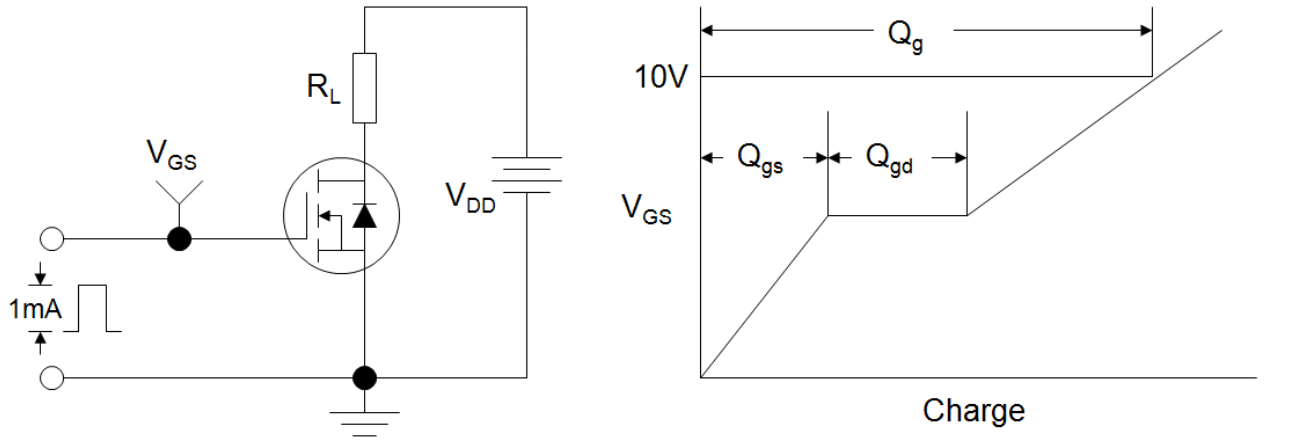


Figure B：Resistive Switching Test Circuit and Waveform

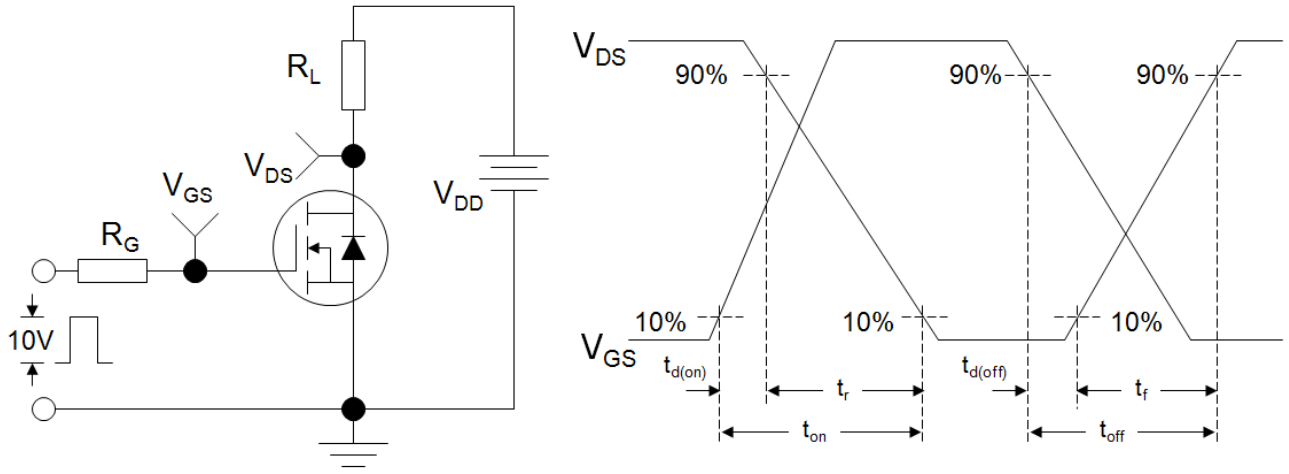
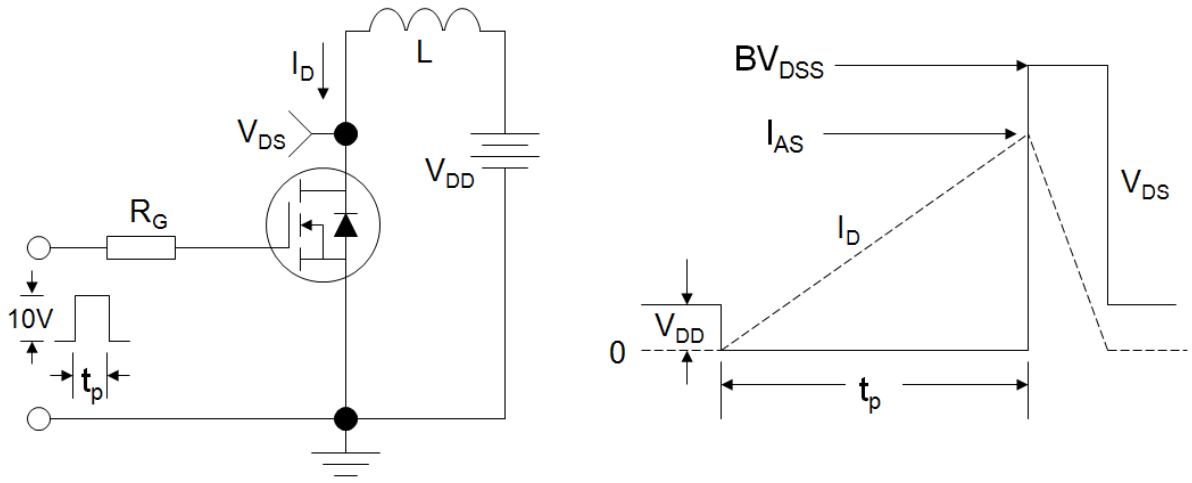
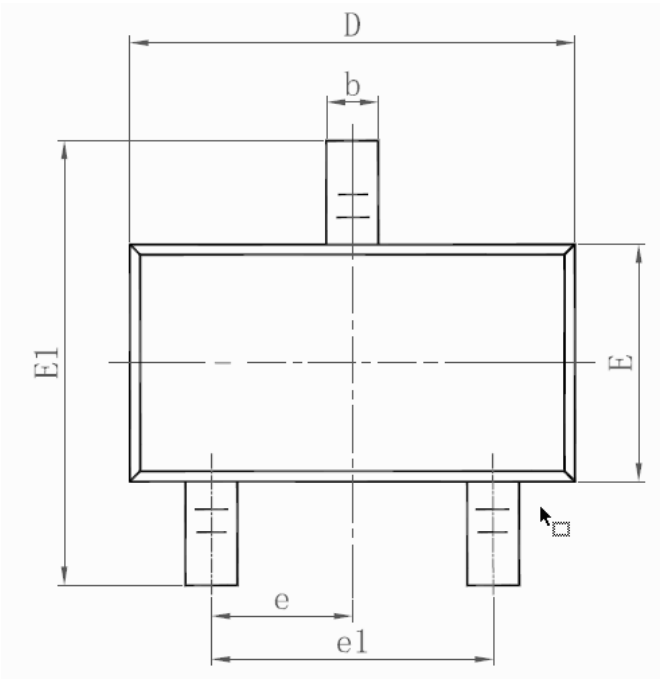
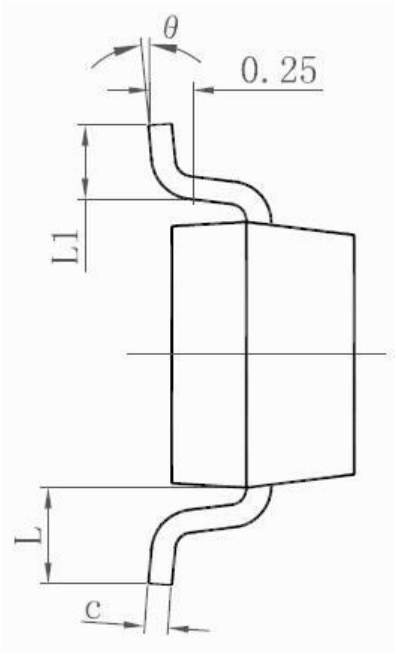


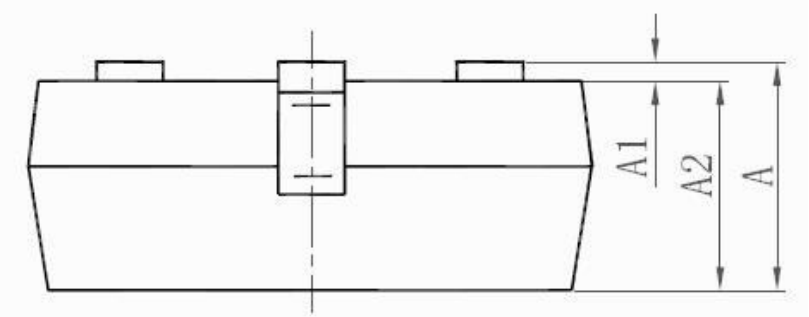
Figure C：Unclamped Inductive Switching Test Circuit and Waveform



SOT-23







Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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